suitable inference method, i.e., a method which allows us, given actual values of input variables (temperature and a change of temperature) to infer from a set of rules the value of the output variable (rpm of the fan). The role of fuzzy logic in such a scenario is that the concept of a fuzzy set allows us to represent linguistic expressions such as "high temperature."

Fuzzy controllers and rule-based fuzzy systems have been employed in a number of real-world products and applications including consumer electronics (fuzzy cameras, fuzzy washing machines, and fuzzy microwaves, for instance), which succeeded particularly in Japan, as well as various other control systems (car braking systems, automatic transmission systems, subway control, and kiln control, for example). Fuzzy control provides an alternative to classical control. Nowadays, courses in fuzzy control are parts of curricula in universities in the United States, Europe, and Japan, as well as other countries. The need for a comprehensive textbook in fuzzy control is thus obvious.

The present book aims to serve as a comprehensive textbook covering introductory as well as advanced topics in fuzzy control. In my opinion, the book has succeeded in achieving this goal.

The book consists of 13 chapters, each with a list of references and an index of key terms. Chapter 1 introduces basic concepts used in the book (preliminaries from fuzzy sets and rough sets). Chapters 2, 3, and 4 introduce three models of nonlinear systems based on fuzzy logic, namely, the Takagi–Sugeno model, a model based on rough sets, and a so-called fuzzy hyperbolic model. Basic descriptions of these models as well as identification of model structures and parameters are presented. Chapters 5, 6, 7, 8, and 9 are concerned with fuzzy inference and control methods. Problems such as design of a fuzzy control system, uncertainty management, performance evaluation, predictive control, and adaptive control are addressed. Chapters 10, 11, 12, and 13 contain various advanced topics in fuzzy control including stability, convergence, and filter design. Every chapter starts with an introduction to the topics dealt with in the chapter, then follows with a technical description of the topic, a couple of examples, a summary, and a list of references. The topics are clearly presented and the examples well chosen. Foundational results are presented in the form of theorems, when possible, which are presented with proofs. References are carefully selected. The only thing I missed in the book is a treatment of Mamdani-type fuzzy controllers.

Of the books on fuzzy control I have had a chance to study, this one ranks among the best. It can be recommended as a textbook for an advanced course in fuzzy control. Moreover, researchers as well as practitioners in the field of control will definitely profit from the book.

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Matrix Methods in Data Mining and Pattern Recognition. *By Lars Elden.* SIAM, Philadelphia, PA, 2007. $69.00. x+224 pp., softcover. ISBN 978-0-898716-26-9.

The author indicates that the book is intended as an undergraduate text for an introduction to data mining for students with some background in scientific computing or numerical analysis. Graduate students from other disciplines (engineering and the physical sciences, for example) will find the background material on linear algebra especially useful. The author seeks to demonstrate that linear algebra is a key player in the development of problem solving techniques in data mining and pattern recognition. One could easily use this book as a text for a second (semester) course in applied linear algebra.

The first nine chapters of the book are devoted to fundamental concepts of linear algebra and matrix decompositions. Topics of this first part of the book include matrix multiplication, matrix norms, rank, linear systems and least squares problems, orthogonality, QR decomposition, singular value decomposition, tensor decomposition, k-means, and nonnegative matrix factorization. Several MATLAB code examples are used to demonstrate the definition, solution, or factorization described. Examples drawn from text or web mining and image analysis are used throughout this section of the book.

The second part of the book spans five chapters and is primarily dedicated to applications of data mining. Topics in handwriting classification, text mining, web page ranking, word and sentence extraction, and face recognition are covered. The effects of different models and/or parameter choices are wonderfully illustrated and help the reader grasp the strengths and weaknesses of competing approaches. In many cases, the author has provided the small data matrix and MATLAB code so that the reader can reproduce the results illustrated. Students will find this feature of the book very useful.

The third and final part of the book is a subject-packed chapter on the algorithms for computing the various matrix decompositions used in the application section. MATLAB code examples and references to available software are provided. Particular attention to the differences in computing dense and sparse matrix decompositions is given.

This is undoubtedly an application-oriented book—only a limited number of mathematical proofs are included. The author intended to reveal the existence and properties of fundamental methods in linear algebra that are used in common data mining tasks. He has succeeded and I wager that both students and faculty will want to keep a copy of this book for their reference shelf long after the semester ends.

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Symbolic Integration. I. Transcendental Functions. Second Edition. *By Manuel Bronstein.* Springer-Verlag, Berlin, 2005. $52.00. xvi+325 pp., hardcover. ISBN 3-540-21493-3.

Symbolic Integration I is the second edition of an extremely thorough account of the problem of integration in finite terms for transcendental functions. The late author Manuel Bronstein presents a modern version of the algorithm commonly grouped under the appellation *Risch algorithm.* The Risch algorithm is concerned with the solution to the problem of integration in finite terms; that is, given a function f, find a function g such that $f = g'$ or prove that no such g exists in terms of elementary functions.

The Risch algorithm can, depending on taste, be broken into four main categories. In increasing level of difficulty they are the logarithmic transcendental, exponential transcendental, pure algebraic, and mixed algebraic/transcendental cases. The first two cases are completely covered in this text. The remaining two cases are covered best in Trager [7] and Bronstein [1].

This book was written by the world's leading expert in the area. Manuel Bronstein was a very strong researcher in the area of symbolic integration; in particular, he developed the theory for the algebraic/transcendental case of the Risch algorithm in his Ph.D. thesis. He programmed the Risch algorithm found in the Scratchpad (now AXIOM) computer algebra system, which is the most complete implementation to date.

This book builds on the work of Bronstein [2, 3], Risch [5], Rothstein [4], and Trager [6], yielding the most complete algorithm for transcendental functions. Bronstein's approach has many computational and theoretical advantages over the original Risch algorithm. The following are worthy of note:

- The algorithms in this book use only rational operations, avoiding factorization of polynomials into irreducibles. For example,

$$\int \frac{2560x^3-400x^2-576x-84}{320x^4+80x^3-12x^2+24x+9}\,dx$$
$$= 2\sqrt{11}\tan^{-1}\left(\frac{7-40x}{5\sqrt{11}}\right)$$
$$- 2\sqrt{11}\tan^{-1}\left(\frac{800x^3-40x^2+30x+57}{6\sqrt{11}}\right)$$
$$+ 2\log\left(320x^4+80x^3-12x^2+24x+9\right)$$

  is found using a square-free factorization algorithm, the Lazard–Rothstein–Trager–Rioboo algorithm. This avoids using the partial fraction method or the Rothstein–Trager algorithm, which requires an irreducible factorization. Consequently, no unnecessary algebraic numbers appear in the result.

- Extensions by tangents and arctangents are treated directly, thereby real trigonometric functions are integrated